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Docket No. 211432US-2

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

IN RE APPLICATION OF: Masumi SATO, et al.

SERIAL NO: 09/903,787

GAU: 2852

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EXAMINER: S. L. Brase

FOR: COLOR IMAGE FORMING APPARATUS, AND TONER REPLENISHING APPARATUS



INFORMATION DISCLOSURE STATEMENT UNDER 37 CFR 1.97

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SIR:

Applicant(s) wish to disclose the following information.

REFERENCES

- ☐ The applicant(s) wish to make of record the references listed on the attached form PTO-1449. Copies of the listed references are attached, where required, as are either statements of relevancy or any readily available English translations of pertinent portions of any non-English language references.
- ☐ A check or credit card payment form is attached in the amount required under 37 CFR §1.17(p).

RELATED CASES

- ☒ Attached is a list of applicant's pending application(s) which may be related to the present application. A copy of the claims and drawings of the pending application(s) is attached.
- ☐ A check or credit card payment form is attached in the amount required under 37 CFR §1.17(p).

CERTIFICATION

- ☐ Each item of information contained in this information disclosure statement was first cited in any communication from a foreign patent office in a counterpart foreign application not more than three months prior to the filing of this statement.
- ☒ No item of information contained in this information disclosure statement was cited in a communication from a foreign patent office in a counterpart foreign application or, to the knowledge of the undersigned, having made reasonable inquiry, was known to any individual designated in 37 CFR §1.56(c) more than three months prior to the filing of this statement.

DEPOSIT ACCOUNT

- ☒ Please charge any additional fees for the papers being filed herewith and for which no check or credit card payment is enclosed herewith, or credit any overpayment to deposit account number 15-0030. A duplicate copy of this sheet is enclosed.

Respectfully submitted,

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LIST OF RELATED CASES

<u>Docket Number</u>	<u>Serial or Patent Number</u>	<u>Filing or Issue Date</u>	<u>Inventor/ Applicant</u>
211432US2*	09/903,787	07/13/01	SATO et al.
242326US2	10/660,571	09/12/03	NOGUCHI et al.

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WHAT IS CLAIMED IS:

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1. A color image forming apparatus, comprising:

an image generating mechanism including,

5 an image forming mechanism configured to form a color image and including a plurality of image creating mechanisms each of which is configured to form an image and includes a photosensitive member,

an optical writing mechanism configured to
10 optically write an image on the photosensitive member of each of the plurality of image creating mechanisms,

an intermediate image-transfer member having an image transfer bed moving in a predetermined direction in a lower part of the intermediate image-transfer member to
15 receive on a surface of the image transfer bed a transfer of a plurality of the images from the respective photosensitive members of the plurality of image creating mechanisms such that the plurality of the images are sequentially overlaid to form a multi-overlaid image,

20 a fixing mechanism configured to fix the multi-overlaid image on a recording sheet,

a sheet ejecting mechanism configured to eject the recording sheet having the fixed multi-overlaid image thereon,

25 a container configured to replenish toner to the image forming mechanism, and

FOR INFORMATION

Related Pending Application

Related Case Serial No: 10/660,571

an electric circuit which includes a plurality of circuit blocks and supplies power and necessary signals to the apparatus; and

a sheet supply mechanism is configured to supply
5 recording sheets through a sheet inlet thereof to the image generating mechanism,

wherein the intermediate image-transfer member is arranged with a predetermined angle relative to a horizontal line such that a rear side of the intermediate image-transfer
10 member away from the recording sheet is lifted and a front side of the intermediate image-transfer member closer to the recording sheet is lowered, and

wherein the plurality of image creating mechanisms are aligned in parallel and are arranged along and parallel to
15 the image transfer bed of the intermediate image-transfer member such that one of the plurality of image creating mechanisms firstly forming an image faces the rear side of the image transfer bed and another one of the plurality of image creating mechanisms lastly forming an image faces the
20 front side of the image transfer bed.

2. The color image forming apparatus as defined in Claim 1, wherein the image generating mechanism further comprises a secondary image-transfer member configured to
25 contact the intermediate image-transfer member to transfer the multi-overlaid image onto the recording sheet from the

intermediate image-transfer member, and wherein the sheet inlet of the sheet supply mechanism, the secondary image-transfer member, the fixing mechanism, and the sheet ejection mechanism are arranged in this order at positions from a lower region to an upper region, and a sheet conveying path provided in an area covering from the sheet inlet to the sheet ejection mechanism through the secondary image-transfer member and the fixing mechanism is extended in nearly a straight manner in a vertical direction in the image generating mechanism.

3. The color image forming apparatus as defined in Claim 1, wherein the toner container is arranged over the intermediate image-transfer member, the optical writing mechanism is arranged under the image forming mechanism, and the toner container is arranged substantially with the predetermined angle to be parallel with the image transfer bed of the intermediate image-transfer member.

4. The color image forming apparatus as defined in Claim 3, wherein the plurality of image creating mechanisms form images of different colors, the toner container includes a plurality of toner cartridges containing toners of the different colors used by the plurality of image creating mechanisms, and a placement order of the plurality of image creating mechanisms is same in color of toner as that of the

plurality of toner cartridges.

5 5. The color image forming apparatus as defined in
Claim 4, wherein distances of sheet paths provided for the
5 toners of the different colors between the plurality of
image creating mechanisms and the plurality of toner
cartridges are substantially equivalent.

10 6. The color image forming apparatus as defined in
Claim 4, wherein one or more of the plurality of toner
cartridges have a toner capacity different than other toner
cartridges of the apparatus.

15 7. The color image forming apparatus as defined in
Claim 3, wherein the toner cartridges are aligned in parallel
in a direction from a front side to a rear side of the
apparatus such that one which is closer to the rear side has
a higher profile, and wherein the toner cartridges are
mounted at positions where the toner cartridges are
20 externally accessible for exchanges with new cartridges when
an upper cover of the apparatus is upwardly opened.

25 8. The color image forming apparatus as defined in
Claim 1, wherein the image generating mechanism forms a space
having a cross section of approximately triangular shape
underneath the optical writing mechanism, and wherein a part

of the electrical circuit is accommodated in the space.

9. The color image forming apparatus as defined in Claim 8, wherein a part of the electrical circuit
5 accommodated in the space underneath the optical writing mechanism is a control unit.

10. The color image forming apparatus as defined in Claim 9, wherein another part of the electrical circuit is a
10 power supply unit mounted outside the space and in the rear side of the apparatus behind the intermediate image-transfer member.

11. The color image forming apparatus as defined in Claim 3, wherein when an origin of x-y coordination is
15 assigned to a rearmost point of the apparatus at a horizontal level of a sheet separation point, T1 and T2 are highest and lowest points, respectively, of a rearmost toner cartridge of the plurality of toner cartridges closest to a rear end of
20 the apparatus, T3 and T4 are highest and lowest points, respectively, of a forefront toner cartridge of the plurality of toner cartridges closest to a front end of the apparatus, HS is a sheet ejection point, TT is a fixing nip center of the fixing mechanism, T1(y) is a highest point in the
25 apparatus, and T1(y) and TT(x) satisfy an inequality $T1(y) \leq TT(x)$.

12. The color image forming apparatus as defined in Claim 11, wherein $TT(y)$ and $T3(y)$ satisfy an inequality $TT(y) \leq T3(y)$.

5

13. The color image forming apparatus as defined in Claim 11, wherein $T3(y)$, $T4(y)$, and $TT(y)$ satisfy inequalities $T4(y) \leq TT(y) \leq T3(y)$.

10 14. The color image forming apparatus as defined in Claim 11, wherein $HS(y)$ and $T1(y)$ satisfy an inequality $HS(y) \leq T1(y)$.

15 15. The color image forming apparatus as defined in Claim 11, wherein $T2(y)$, $HS(y)$, and $T1(y)$ satisfy inequalities $T2(y) \leq HS(y) \leq T1(y)$.

16. The color image forming apparatus as defined in Claim 1, wherein the predetermined angle with which the intermediate image-transfer member is tilted is in a range between approximately 5 degrees and 25 degrees.

17. A color image forming apparatus comprising:
image generating means including, image forming
25 means for forming a color image and including a plurality of

image creating means for forming an image, each of which includes photosensitive means for sensing light information,

optical writing means for optically writing an image on the photosensitive means of each of the plurality of
5 image creating means,

intermediate image-transfer means having an image transfer bed moving in a predetermined direction in a lower part of the intermediate image-transfer means to receive on a surface of the image transfer bed a transfer of
10 a plurality of the images from the respective photosensitive means of the plurality of image creating means such that the plurality of the images are sequentially overlaid to form a multi-overlaid image,

fixing for fixing the multi-overlaid image on a
15 recording sheet,

sheet ejecting means for ejecting the recording sheet having the fixed multi-overlaid image thereon,

toner supply means for replenishing color toner to the image forming means, and

20 electric circuit means including a plurality of circuit blocks and supplying power and necessary signals to the apparatus; and

a sheet supplying means supplies recording sheets through a sheet inlet thereof to the image generating means,

25 wherein the intermediate image-transfer means is arranged with a predetermined angle relative to a horizontal

line such that a rear side of the intermediate image-transfer means away from the recording sheet is lifted and a front side of the intermediate image-transfer means closer to the recording sheet is lowered, and

5 wherein the plurality of image creating means are aligned in parallel and are arranged along and parallel to the image transfer bed of the intermediate image-transfer means such that one of the plurality of image creating means firstly forming an image faces the rear side of the image
10 transfer bed and another one of the plurality of image creating means lastly forming an image faces the front side of the image transfer bed.

18. The color image forming apparatus as defined in
15 Claim 17, wherein the image generating means further includes a secondary image-transfer means for contacting the intermediate image-transfer means to transfer the multi-overlaid image onto the recording sheet from the intermediate image-transfer means, and wherein the sheet inlet of the
20 sheet supply means, the secondary image-transfer means, the fixing means, and the sheet ejection means are arranged in this order at positions from a lower region to an upper region, and a sheet conveying path provided in an area covering from the sheet inlet to the sheet ejection means
25 through the secondary image-transfer means and the fixing means is extended in nearly a straight manner in a vertical

direction in the image generating means.

19. The color image forming apparatus as defined in Claim 17, wherein the toner supply means is arranged over the intermediate image-transfer means, the optical writing means is arranged under the image forming means, and the toner supply means is arranged substantially with the predetermined angle to be parallel with the image transfer bed of the intermediate image-transfer means.

10

20. The color image forming apparatus as defined in Claim 19, wherein the plurality of image creating means form images of different colors, the toner supply means includes a plurality of toner cartridges containing toners of the different colors used by the plurality of image creating means, and a placement order of the plurality of image creating means is same in color of toner as that of the plurality of toner cartridges.

20 21. The color image forming apparatus as defined in Claim 20, wherein distances of sheet paths provided for the toners of the different colors between the plurality of image creating means and the plurality of toner cartridges are substantially equivalent.

25

22. The color image forming apparatus as defined in

Claim 20, wherein one or more of the plurality of toner cartridges have a toner capacity different than other toner cartridges of the apparatus.

5 23. The color image forming apparatus as defined in Claim 19, wherein the plurality of toner cartridges are aligned in parallel in a direction from a front side to a rear side of the apparatus such that one which is closer to the rear side has a higher profile, and wherein the toner
10 cartridges are mounted at positions where the toner cartridges are externally accessible for exchanges with new cartridges when an upper cover of the apparatus is upwardly opened.

15 24. A color image forming apparatus as defined in Claim 17, wherein the image generating means forms a space having a cross section of approximately triangular shape underneath the optical writing means, and wherein a part of the electrical circuit means is accommodated in the space.

20

 25. The color image forming apparatus as defined in Claim 24, wherein a part of the electrical circuit means accommodated in the space underneath the optical writing means is a control unit.

25

 26. The color image forming apparatus as defined in

Claim 25, wherein another part of the electrical circuit means is a power supply unit mounted outside the space and in the rear side of the apparatus behind the intermediate image-transfer means.

5

27. The color image forming apparatus as defined in Claim 19, wherein when an origin of x-y coordination is assigned to a rearmost point of the apparatus at a horizontal level of a sheet separation point, T1 and T2 are highest and lowest points, respectively, of a rearmost toner cartridge of the plurality of toner cartridges closest to a rear end of the apparatus, T3 and T4 are highest and lowest points, respectively, of a forefront toner cartridge of the plurality of toner cartridges closest to a front end of the apparatus, HS is a sheet ejection point, TT is a fixing nip center of the fixing means, T1(y) is a highest point in the apparatus, and T1(y) and TT(x) satisfy an inequality $T1(y) \leq TT(x)$.

28. The color image forming apparatus as defined in Claim 27, wherein TT(y) and T3(y) satisfy an inequality $TT(y) \leq T3(y)$.

29. The color image forming apparatus as defined in Claim 27, wherein T3(y), T4(y), and TT(y) satisfy inequalities $T4(y) \leq TT(y) \leq T3(y)$.

30. The color image forming apparatus as defined in Claim 27, wherein $HS(y)$ and $T1(y)$ satisfy an inequality $HS(y) \leq T1(y)$.

5 31. The color image forming apparatus as defined in Claim 27, wherein $T2(y)$, $HS(y)$, and $T1(y)$ satisfy inequalities $T2(y) \leq HS(y) \leq T1(y)$.

32. The color image forming apparatus as defined in
10 Claim 17, wherein the predetermined angle with which the intermediate image-transfer means is tilted is in a range between approximately 5 degrees and 25 degrees.

33. A method of making a color image forming
15 apparatus having an image generating mechanism and a sheet supplying mechanism, the image generating mechanism including an image forming mechanism for forming a color image and including a plurality of image creating means each of which forms an image and includes a photosensitive member for
20 sensing light information, an optical writing mechanism for optically writing an image on the photosensitive member of each of the plurality of image creating mechanisms, an intermediate image-transfer member having an image transfer bed moving in a predetermined direction in a lower part of
25 the intermediate image-transfer member to receive on a surface of the image transfer bed a transfer of a plurality

of the images from the respective photosensitive members of the plurality of image creating mechanisms such that the plurality of the images are sequentially overlaid to form a multi-overlaid image, a fixing mechanism for fixing the

5 multi-overlaid image on a recording sheet, a sheet ejecting mechanism for ejecting the recording sheet having the fixed multi-overlaid image thereon, a toner supply mechanism for replenishing color toner to the image forming mechanism, and an electric circuit having a plurality of circuit blocks and

10 supplying power and necessary signals to the apparatus, and the sheet supplying mechanism supplying recording sheets through a sheet inlet thereof to the image generating mechanism, the method comprising :

tilting the intermediate image-transfer member at

15 a predetermined angle relative to a horizontal line such that a rear side of the intermediate image-transfer member away from the recording sheet is lifted and a front side of the intermediate image-transfer member closer to the recording sheet is lowered;

20 aligning the plurality of image creating mechanisms in parallel; and

arranging the plurality of image creating mechanisms along and parallel to the image transfer bed of the intermediate image-transfer member such that one of the

25 plurality of image creating mechanisms firstly forming an image faces the rear side of the image transfer bed and

another one of the plurality of image creating mechanisms lastly forming an image faces the front side of the image transfer bed.

5 34. The method as defined in Claim 33, wherein the image generating mechanism further has a secondary image-transfer mechanism for contacting the intermediate image-transfer member to transfer the multi-overlaid image onto the recording sheet from the intermediate image-transfer member,
10 and the method further comprises:

 disposing the sheet inlet of the sheet supply mechanism, the secondary image-transfer member, the fixing mechanism, and the sheet ejection mechanism in this order to positions from a lower region to an upper region of the
15 apparatus; and

 extending a sheet conveying path provided in an area covering from the sheet inlet to the sheet ejection mechanism through the secondary image-transfer mechanism and the fixing mechanism in nearly a straight manner in a
20 vertical direction in the image generating mechanism.

 35. The method as defined in Claim 33, further comprising :

 mounting the toner supply mechanism over the
25 intermediate image-transfer member;

 setting the optical writing mechanism under the image

forming mechanism; and

angling the toner supply means at substantially an equivalent angle with the predetermined angle to be parallel with the image transfer bed of the intermediate image-
5 transfer member.

36. The method as defined in Claim 35, wherein the plurality of image creating mechanisms form images of different colors, the toner supply mechanism includes a
10 plurality of toner cartridges containing toners of the different colors used by the plurality of image creating mechanisms, and a placement order of the plurality of image creating mechanisms is same in color of toner as that of the plurality of toner cartridges.

15

37. The method as defined in Claim 36, wherein distances of sheet paths provided for the toners of the different colors between the plurality of image creating mechanisms and the plurality of toner cartridges are
20 substantially equivalent.

38. The method as defined in Claim 36, wherein one or more of the plurality of toner cartridges have a toner capacity different than other toner cartridges of the
25 apparatus.

39. The method as defined in Claim 35, further comprising :

aligning the plurality of toner cartridges in parallel in a direction from a front side to a rear side of the
5 apparatus such that one which is closer to the rear side has a higher profile; and

mounting the plurality of toner cartridges at positions where the toner cartridges are externally accessible for exchanges with new cartridges when an upper cover of the
10 apparatus is upwardly opened.

40. The method as defined in Claim 33, wherein the image generating mechanism forms a space having a cross section of approximately triangular shape underneath the
15 optical writing mechanism, and wherein the method further comprises accommodating a part of the electrical circuit in the space.

41. The method as defined in Claim 40, wherein a
20 part of the electrical circuit accommodated in the space underneath the optical writing mechanism is a control unit.

42. The method as defined in Claim 41, further comprising mounting another part of the electrical circuit
25 which is a power supply unit outside the space and in the rear side of the apparatus behind the intermediate image-

transfer member.

43. The method as defined in Claim 42, wherein when an origin of x-y coordination is assigned to a rearmost point of the apparatus at a horizontal level of a sheet separation point, T1 and T2 are highest and lowest points, respectively, of a rearmost toner cartridge of the plurality of toner cartridges closest to a rear end of the apparatus, T3 and T4 are highest and lowest points, respectively, of a forefront toner cartridge of the plurality of toner cartridges closest to a front end of the apparatus, HS is a sheet ejection point, TT is a fixing nip center of the fixing mechanism, T1(y) is a highest point in the apparatus, and T1(y) and TT(x) satisfy an inequality $T1(y) \leq TT(x)$.

15

44. The method as defined in Claim 43, wherein TT(y) and T3(y) satisfy an inequality $TT(y) \leq T3(y)$.

45. The method as defined in Claim 43, wherein T3(y), T4(y), and TT(y) satisfy inequalities $T4(y) \leq TT(y) \leq T3(y)$.

46. The method as defined in Claim 43, wherein HS(y) and T1(y) satisfy an inequality $HS(y) \leq T1(y)$.

25

47. The method as defined in Claim 27, wherein $T2(y)$, $HS(y)$, and $T1(y)$ satisfy inequalities $T2(y) \leq HS(y) \leq T1(y)$.

5 48. A method as defined in Claim 33, wherein the predetermined angle with which the intermediate image-transfer member is tilted is in a range between approximately 5 degrees and 25 degrees.

ABSTRACT

The present invention relates to an electrophotographic color image forming apparatus using a tandem-drum development, an indirect image-transfer method, and a vertical sheet supply path. An intermediate image-transfer member is angled relative to a horizontal line such that a rear side of the intermediate image-transfer member away from a recording sheet is lifted and a front side of the intermediate image-transfer member closer to the recording sheet is lowered. Further, image creating mechanisms of the tandem-drum development are aligned and arranged in parallel to a moving image transfer bed of the intermediate image-transfer member, such that one of the image creating mechanisms firstly forming an image faces the rear side of the moving image transfer bed and another one of the image creating mechanisms lastly forming an image faces the front side.

FIG. 1 PRIOR ART

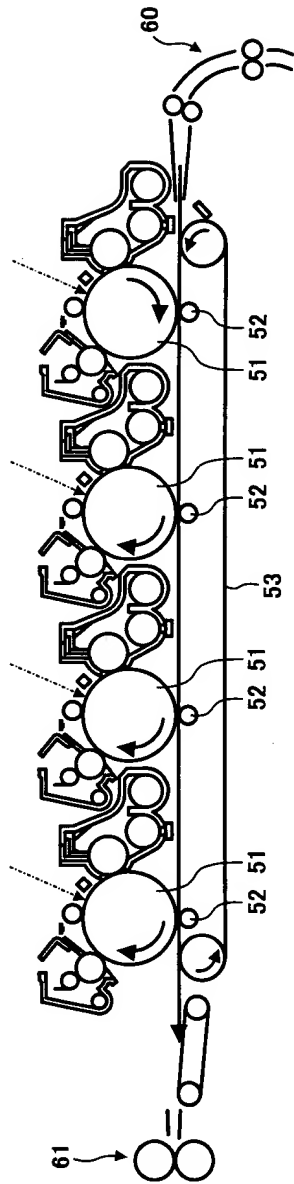


FIG. 2 PRIOR ART

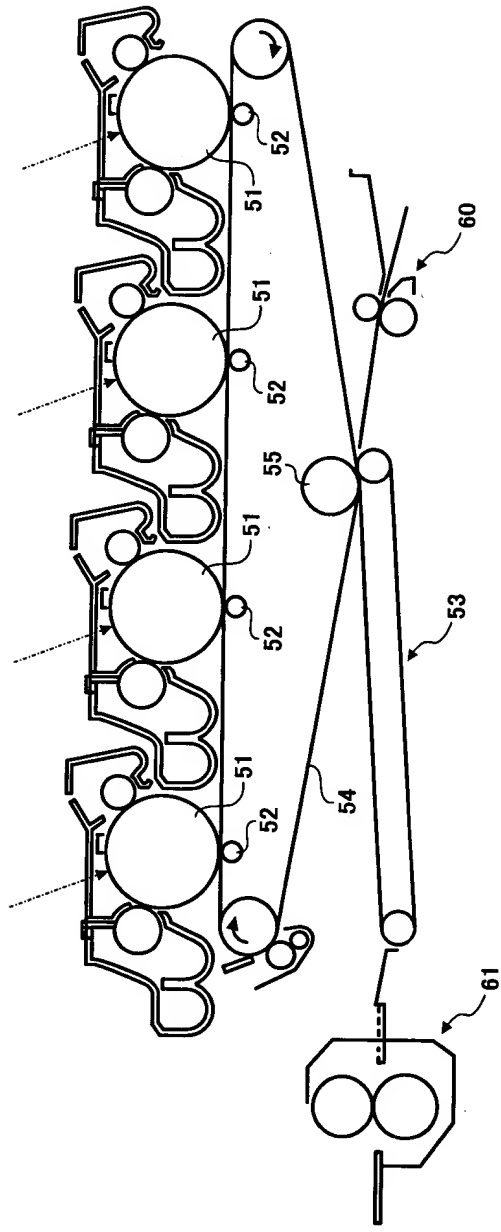


FIG. 3 PRIOR ART

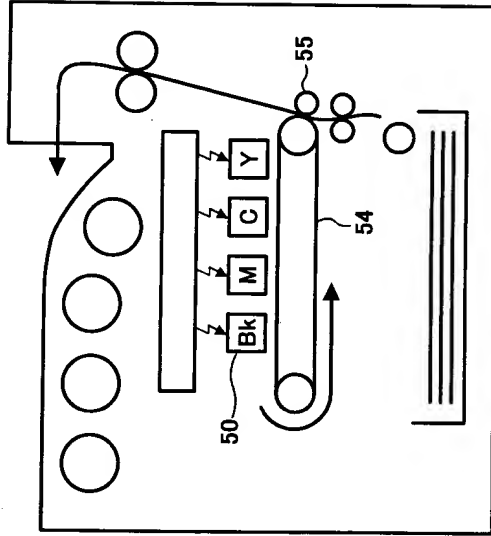


FIG. 4 PRIOR ART

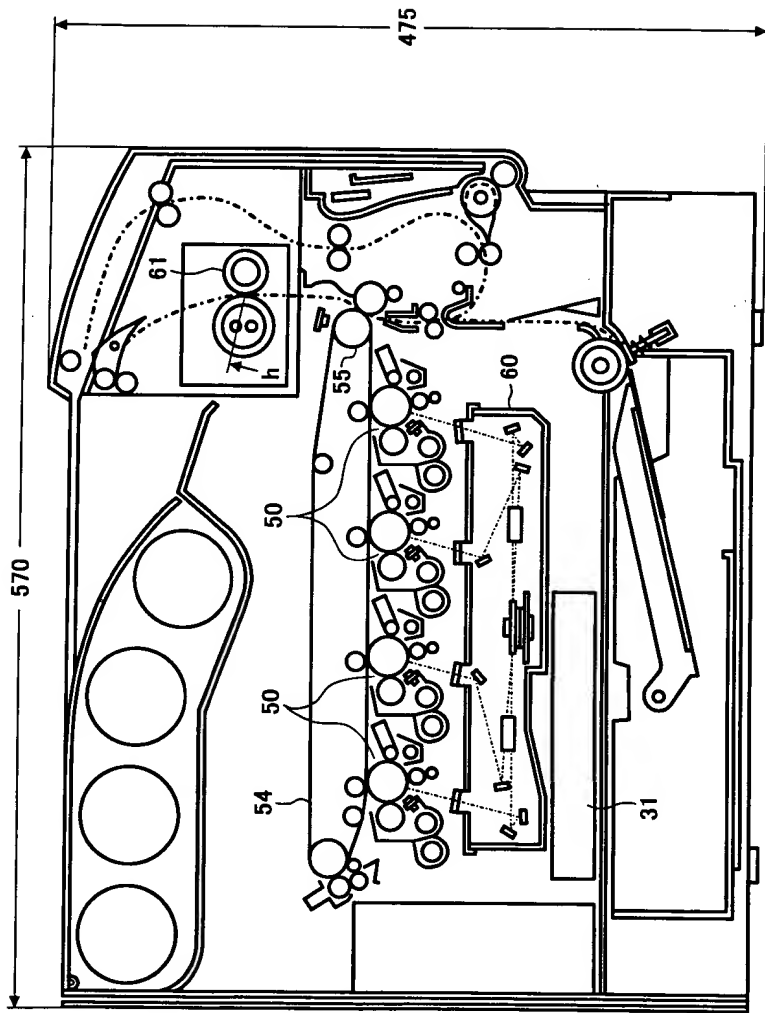


FIG. 5 PRIOR ART

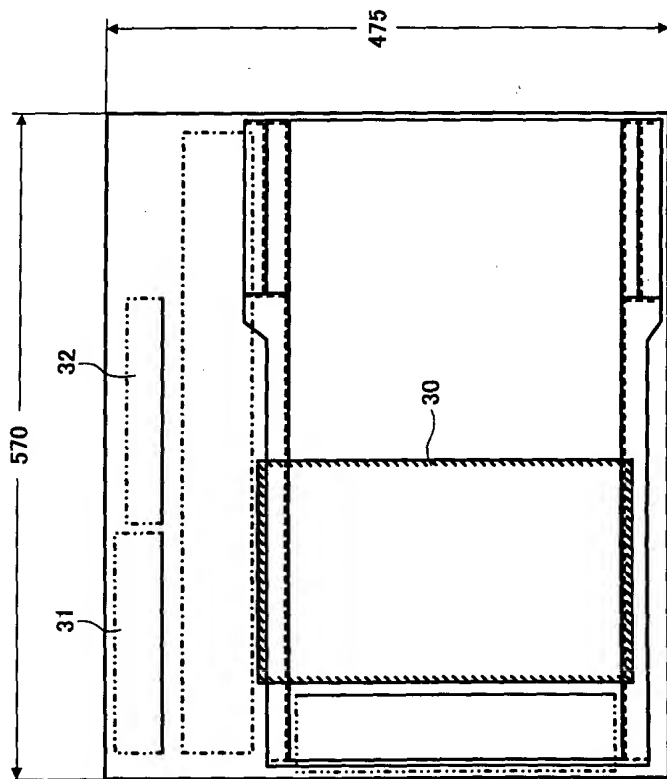


FIG. 6
PRIOR ART

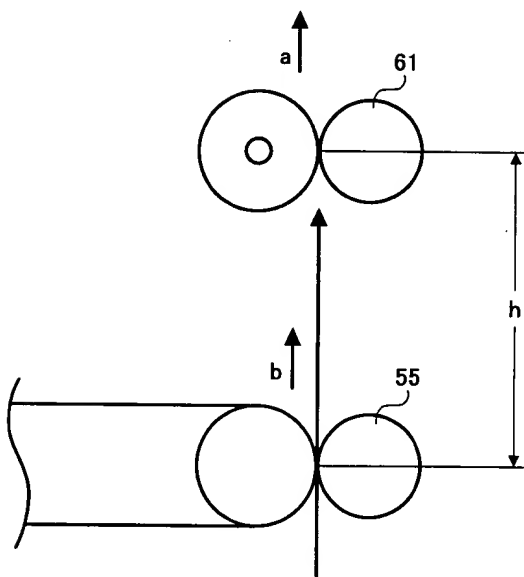


FIG. 7

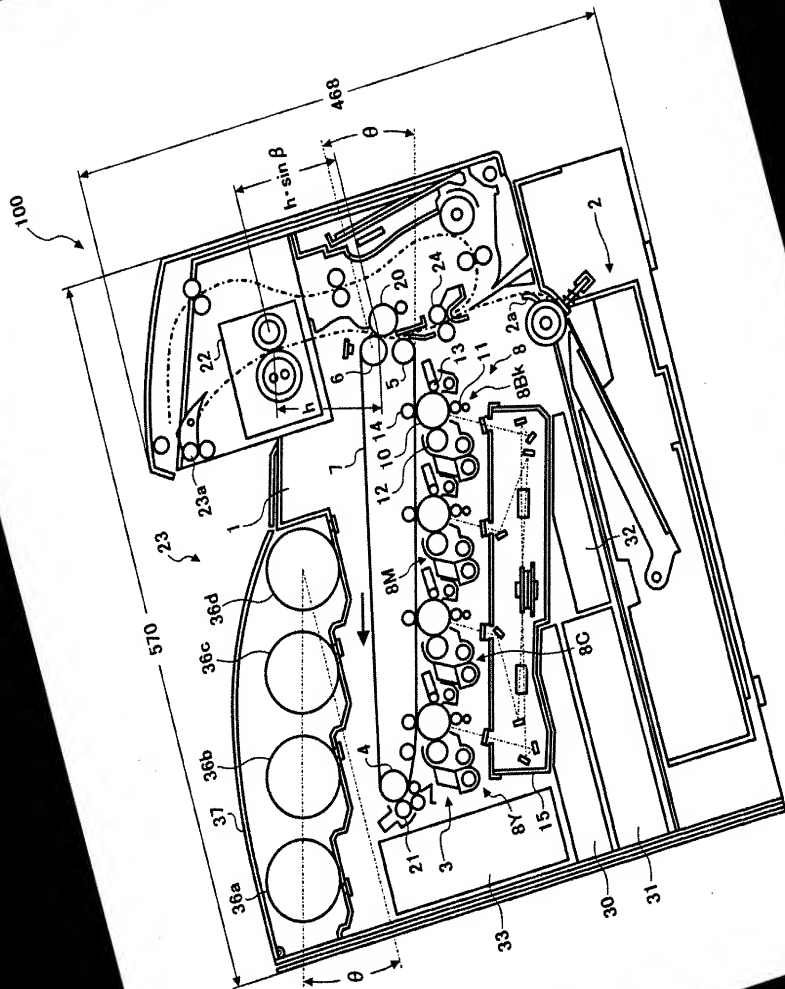


FIG. 8

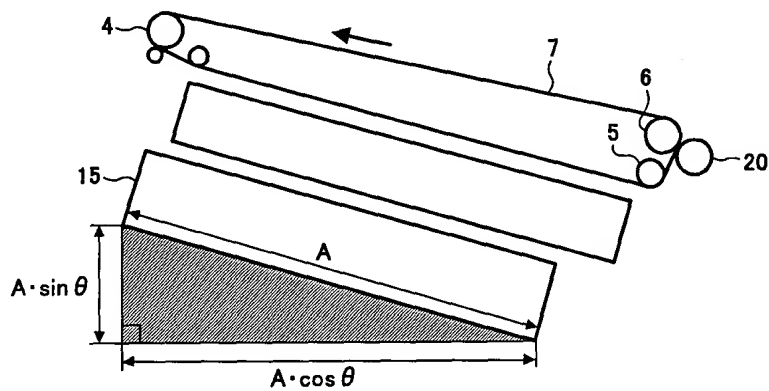


FIG. 9

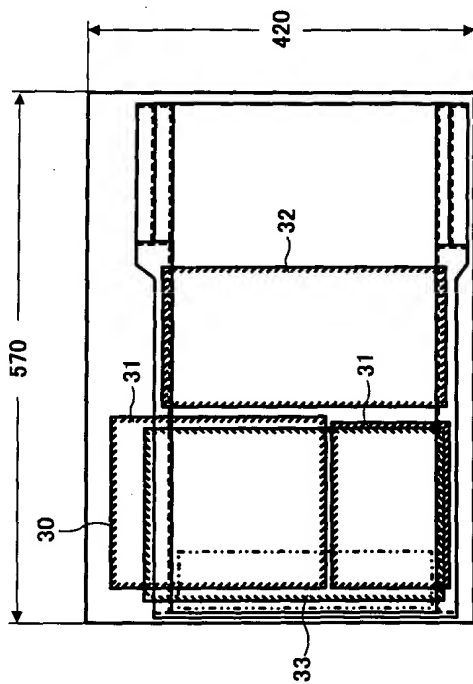


FIG. 10

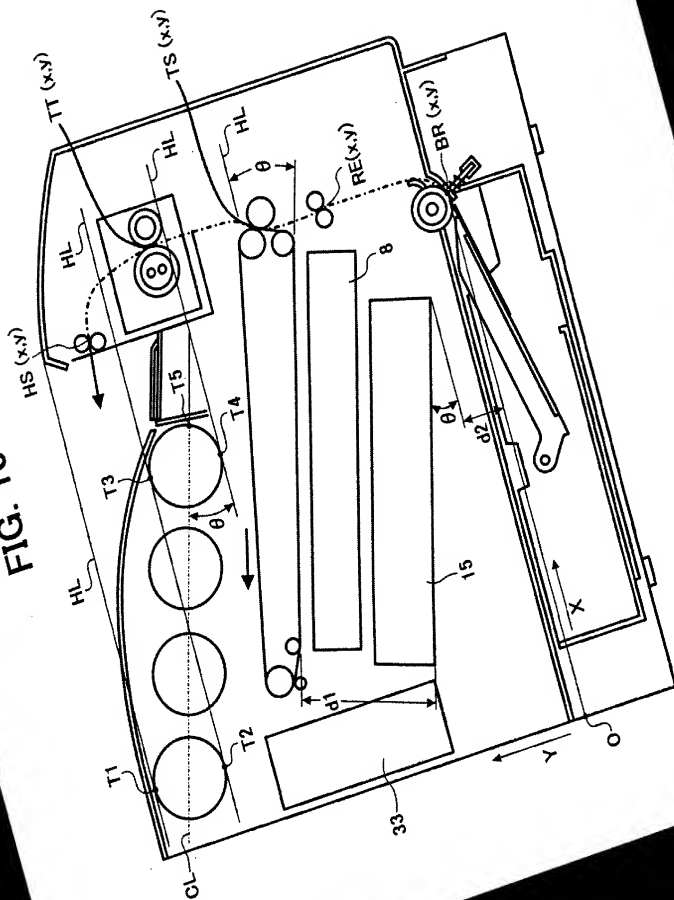


FIG. 11

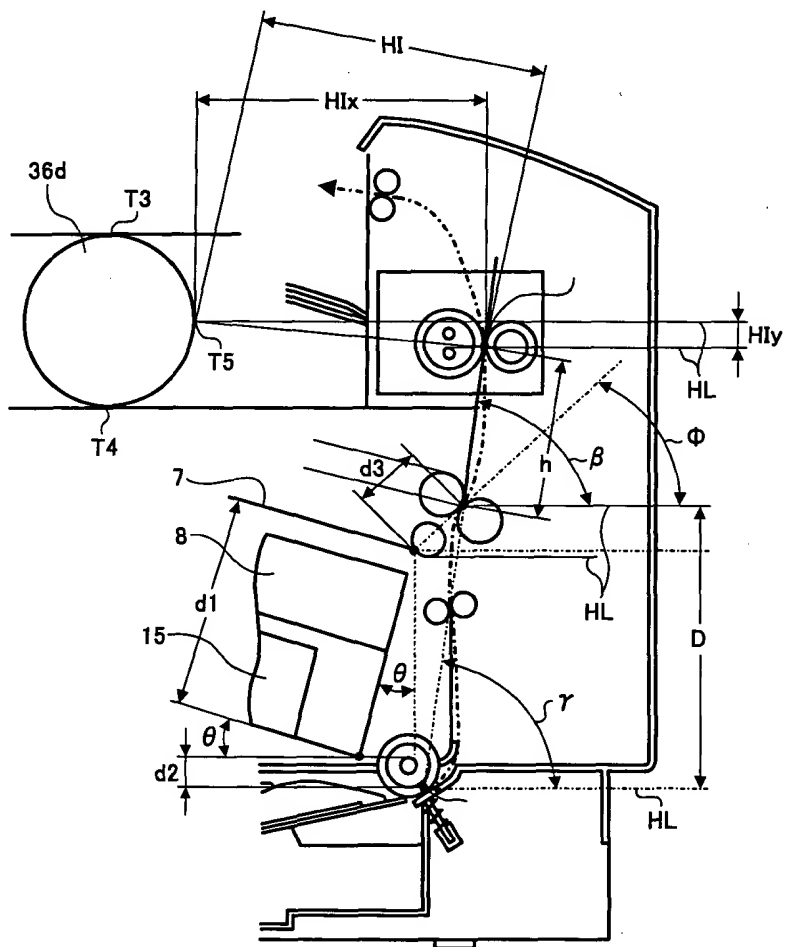


FIG. 12

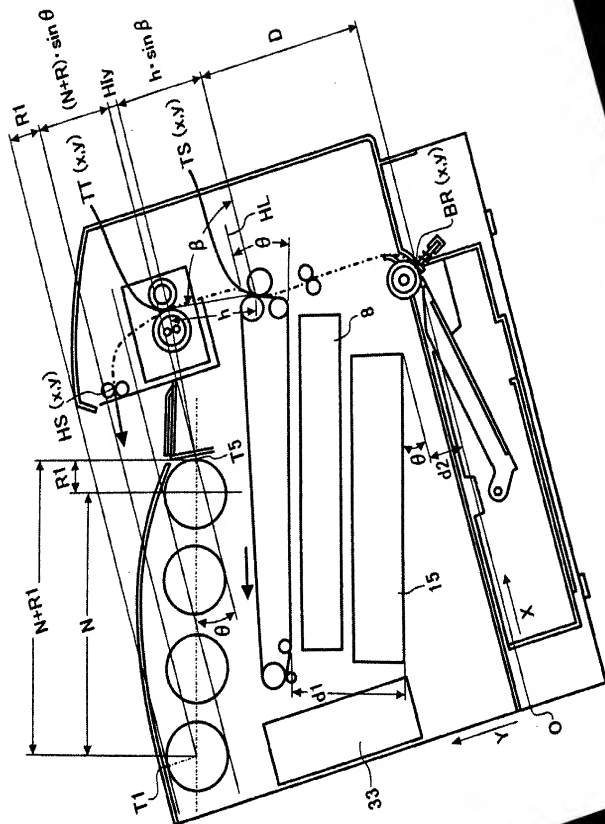


FIG. 13

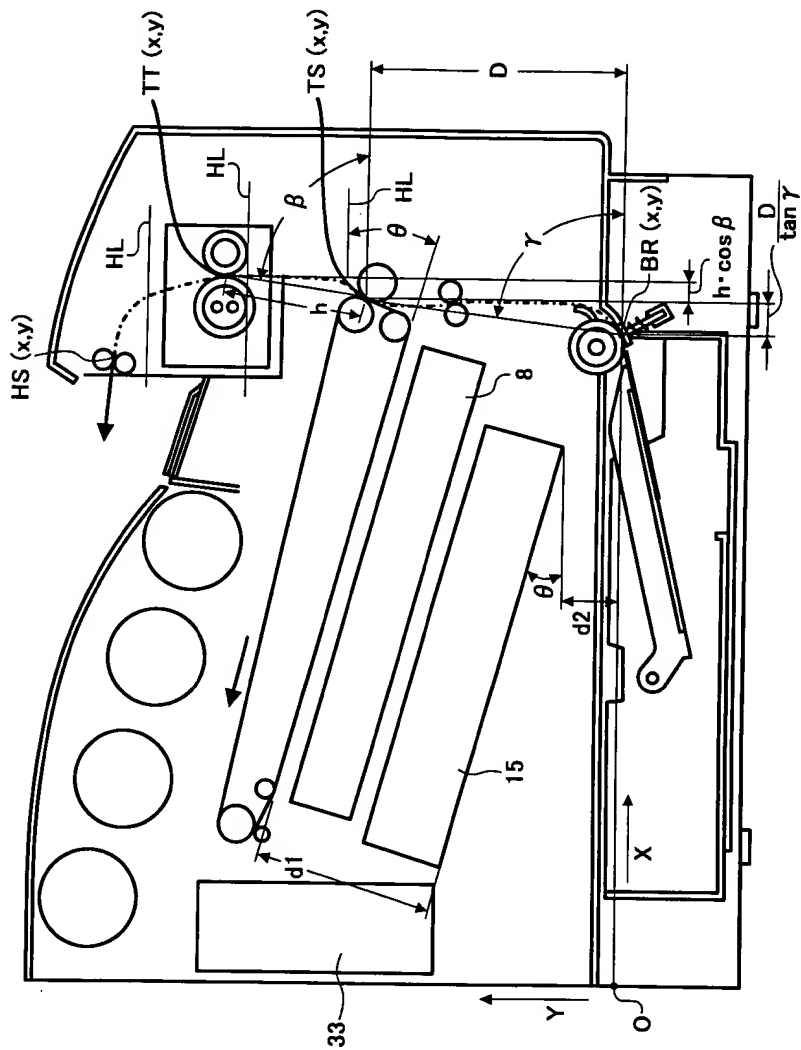


FIG. 14

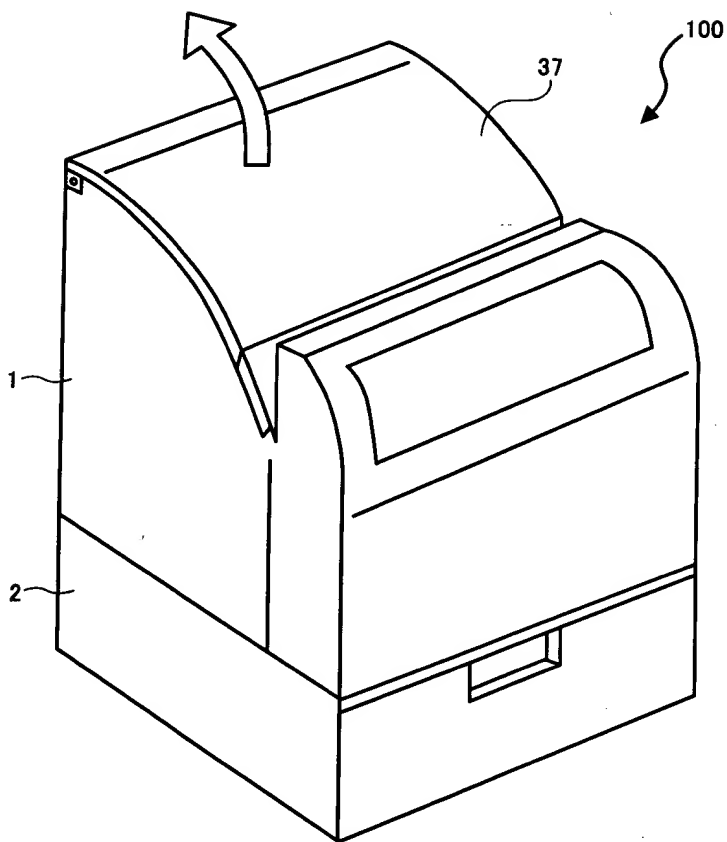


FIG. 15

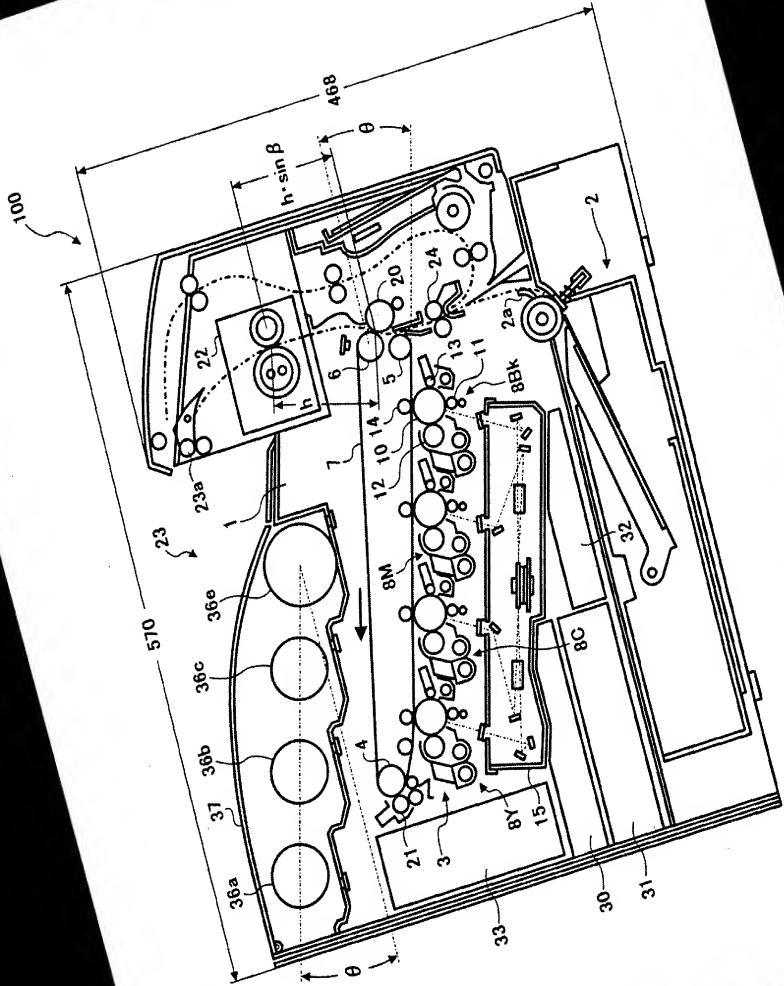
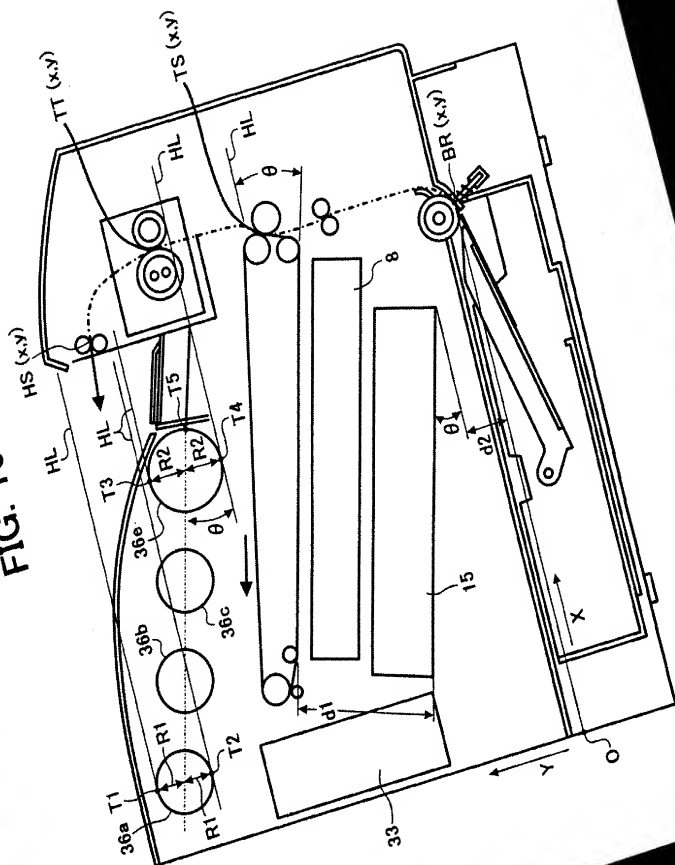


FIG. 16





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